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10/763,734	01/23/2004	Robert J. Burnett	P1938US00	7329

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EXAMINER	
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ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/763,734	BURNETT ET AL.	
	Examiner	Art Unit	
	HETUL PATEL	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7,8,10-13,16-19,21,23,25 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7,8,10-13,16-19,21,23,25 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/22/2008 has been entered and carefully considered.

2. Claims 1, 3-4, 7-8, 11-13, 16-17, 21 and 25 are amended; claim 27 is newly added; and claims 9, 24 and 26 are cancelled. Therefore, claims 1-5, 7-8, 10-13, 16-19, 21, 23, 25 and 27 are currently pending in this application.

3. Applicant's arguments filed on 01/22/2008 have been considered but they are not persuasive.

4. The rejection of claims 1-5, 7-8, 10-13, 16-19, 21, 23 and 25 as in the previous Office Action is respectfully maintained but updated to show the changes made by the amendment.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 7, 11, 13, 16, 20, 23, 25 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Talluri (USPN: 2004/0153481).

As per claim 1, Talluri, in paragraphs [0015]-[0016], teaches a method of creating a virtual disk storage (i.e. the combination of shared storage capacity segments) construct using disk storage consolidated from at least two grid computers (i.e. nodes 1-n, 10 in Fig. 1) of a computing grid utilizing a connecting network (i.e. network 12 in Fig. 1), comprising: loading an agent application (i.e. the storage policy) onto at least one grid computer of the ay least two grid computers (i.e. on each node of storage group (SG)); locating, by the agent application (i.e. by the storage policy; seamlessly managing, which includes locating and assigning, storage space by the storage policy), an unused portion of disk storage space on a disk drive of the at least one grid computer (i.e. determining the percentage of unused storage capacity on a server group) connected by the connecting network of the computing grid; receiving, by the agent application on the at least one grid computer, from a local user of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local use by the local user (i.e. minimum amount/percentage of unused storage space/capacity to be maintained/reserved on SG or at least one node is inherently defined/designed/set by the user in the storage policy. In other words, the admin/user of the storage system has to initially set the minimum amount/percentage described above in the storage policy);

and presenting, as a single combined virtual storage drive on at least one computer (i.e. on a particular node when the data capacity of that node has been used), a portion of the unused portion of the disk storage space from the disk drive of the at least one grid computer (i.e. certain percentage of unused storage capacity on a server group) (e.g. see paragraph [0015] and Fig. 1). Furthermore, Talluri inherently does teach the claimed monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]).

As per claim 2, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the method including allocating a portion of the total disk storage space on the at least one grid computer (i.e. certain percentage of unused storage capacity on nodes) to be made available as part of the virtual storage drive (i.e. the combination of shared storage capacity segments) (e.g. see paragraphs [0015]).

As per claim 3, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on the at least one grid computer (i.e. nodes), the reserved portion of the disk drives including the minimum amount of disk storage space designated by the local user that is reserved for local use on the at least one grid computer (e.g. see paragraph [0015]).

As per claim 4, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about determining, by the agent application (i.e. by the storage policy; seamlessly managing, which includes determining, storage space by the storage policy), the total disk storage space on the at least one grid computer and allocating the total disk storage space (i.e. total or unused storage capacity) between a portion made available for use as part of the virtual storage drive (i.e. certain percentage of unused storage capacity made available to share with other resources/nodes) and a portion reserved for local use on the at least one grid computer (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node) including the minimum amount of free disk storage space designated by the local user that is reserved for local use on the at least one grid computer (i.e. minimum amount/percentage of unused storage space/capacity to be maintained/reserved on SG or at least one node is inherently defined/designed/set by the user in the storage policy. In other words, the admin/user of the storage system has to initially set the minimum amount/percentage described above in the storage policy) (e.g. see paragraph [0015]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. certain percentage) and the portion reserved for local use on the grid computer is of a fixed size (i.e. certain percentage), the size of the portion reserved for local use being fixed by the local user through the designation of the minimum amount of free disk storage space (i.e. minimum amount/percentage of unused storage space/capacity to be maintained/reserved on SG or at least one node is inherently defined/designed/set by the user in the storage policy. In other words, the

admin/user of the storage system has to initially set the minimum amount/percentage described above in the storage policy) (e.g. see paragraph [0015]).

As per claim 7, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about reallocating disk storage space on the at least one grid computer by the agent application (i.e. by the storage policy; seamlessly managing, which includes reallocating, storage space by the storage policy) after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

As per claim 13, see arguments with respect to the rejection of claims 1-3. Claim 13 is also rejected based on the same rationale as the rejection of claims 1-3.

As per claim 16, see arguments with respect to the rejection of claim 1. Claim 16 is also rejected based on the same rationale as the rejection of claim 1.

As per claim 11, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the method additionally including loading the agent application (i.e. the storage policy) on each of the at least two grid computers (i.e. in each node) for managing the portion of the unused portion of the total disk storage

space on the grid computer made available to the virtual storage drive (e.g. see paragraphs [0015]-[0016]).

As per claim 20, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches that the step of reserving a portion of the total disk storage space includes restricting the reserved portion from inclusion in the single virtual storage presented (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claim 23, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about a portion of predetermined size of the total disk storage space includes restricting the reserved portion of predetermined size of the total disk storage space from being included in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claim 25, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about monitoring at least one of the grid computers for activity indicating that a total of disk storage space on the at least one grid computer has been increased, wherein monitoring includes determining that a total disk storage space on the at least one grid computer has been increased when the agent application detects the addition of a disk drive (i.e. additional data storage resource) to the at least one grid computer (this feature is inherently taught by disclosing about using the

portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider) (e.g. see paragraph [0016]).

As per claim 27, Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about detecting, by the agent application, activity on the at least one grid computer indicating that additional storage space has been added to the at least one grid computer. (in paragraph [0016], Talluri discloses about temporarily, seamlessly segmenting and using a portion of the available storage space of the other servers, until additional data storage resources are installed on this particular server. In other words, the available data storage capacity is constantly monitored (even after the portion of the storage capacity is assigned from other server(s)) on the particular server to see if additional storage space is added or not).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5, 7, 10-11, 13, 16, 18, 20, 22-23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne et al. (USPN: 2002/0194340) hereinafter, Ebstyne in view of Talluri.

As per claim 1, Ebstyne teaches a method of creating a virtual disk storage (i.e. the aggregated contiguous virtual data storage space) construct using disk storage consolidated from at least two grid computers (i.e. from PC hard drives from distributed network system) of a computing grid utilizing a connecting network (i.e. via network as shown in Fig. 1), comprising: loading an agent application (i.e. a part of the client tier in all enterprise personal computers) onto at least one grid computer of the at least two grid computers (in all enterprise personal computers) (see paragraph [0077]); locating, by the agent application (i.e. a part of the client tier; see paragraph [0079]), an unused portion of disk storage space on a disk drive of the at least one grid computer (i.e. unused/additional hard drive space from the PCs on the distributed network system) connected by the connecting network of the computing grid; receiving, by the agent application on the at least one grid computer, from a local user of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local use by the local user (Ebstyne discloses, in paragraph [0077], "[T]he client tier 46 serves several functions, such as *reserving a configurable portion of available storage space* and reacting dynamically to the changing local environment.", i.e. the admin/user can configure/designate the portion of available space to be reserved); and presenting, as a single combined virtual storage drive on at least one computer (i.e. for any PC connected on the enterprise network), a portion of the unused portion (i.e. the unused/additional hard drive space from the PCs on the distributed network system) of the disk storage space from the disk drive of the at least one grid computer (i.e. the aggregated contiguous virtual data

storage space made of plurality of PC hard drives on network) (e.g. see paragraphs [0025]-[0026] and [0030]-[0031] and Fig. 1).

However, Ebstyne does not disclose about monitoring at least one of the grid computers for activity indicating that additional disk storage space has been *added* to the at least one grid computer. Talluri, on the other hand, teaches the claimed monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Talluri in the method taught by Ebstyne so whenever a new storage disk is added to a node, it can be detected and the portion of the unused space of the new storage disk can be added to the aggregated contiguous virtual data storage space for use by other nodes. Therefore, the new storage disk space can be used efficiently.

As per claim 2, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the method including allocating a portion of the total disk storage space on the at least one grid computer (i.e. the unused/additional hard drive space from the PCs on the distributed network system) to be made available as part of the virtual storage drive (i.e. the aggregated contiguous virtual data storage space) (e.g. see paragraphs [0025]-[0026]).

As per claim 3, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about reserving a portion of predetermined size of the total disk storage space (i.e. 15% of the PD's disk space) on the at least one grid computer (i.e. PCs on the network) (e.g. see paragraph [0031]), but does not specifically disclose that the reserved portion of the disk drives including the minimum amount of disk storage space designated by the local user that is reserved for local use on the at least one grid computer. Talluri, however, discloses about reserving a portion of predetermined size (by the user in the policy) of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on the at least one grid computer (i.e. nodes), the reserved portion of the disk drives being reserved for local use on the at least one grid computer (e.g. see paragraph [0015]).

As per claim 4, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about determining, by the agent application, the total disk storage space on the at least one grid computer and allocating the total disk storage space (i.e. more than 1.5 petabytes) between a portion made available for use as part of the virtual storage drive (i.e. about 330 terabytes of additional/unused space) and leaving a portion of the total disk space as free (i.e. 15% of the disk space) (e.g. see paragraph [0031]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. 85% of the disk space) and the free portion is of a fixed size (i.e. 15% of the disk space) (e.g. see paragraph [0031]). However, Ebstyne does not specify that the free portion is reserved

for local use on the at least one grid computer. Talluri teaches this limitation by disclosing reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on the at least one grid computer (i.e. nodes), the reserved portion of the disk drives being reserved for local use on the at least one grid computer, the size of the portion reserved for local use being fixed by the local user through the designation of the minimum amount of free disk storage space (i.e. minimum amount/percentage of unused storage space/capacity to be maintained/reserved on SG or at least one node is inherently defined/designed/set by the user in the storage policy. In other words, the admin/user of the storage system has to initially set the minimum amount/percentage described above in the storage policy) (e.g. see paragraph [0015]).

As per claim 5, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about maintaining a table of grid computers contributing storage space to the virtual storage drive and corresponding amounts of storage space made available by each contributing grid computers (e.g. see paragraph [0067]).

As per claim 7, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about reallocating disk storage space on the at least one grid computer by the agent application (i.e. by the storage policy; seamlessly managing, which includes reallocating, storage space by the storage policy) after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources

on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

As per claim 13, see arguments with respect to the rejection of claims 1-3. Claim 13 is also rejected based on the same rationale as the rejection of claims 1-3.

As per claim 16, see arguments with respect to the rejection of claim 1. Claim 16 is also rejected based on the same rationale as the rejection of claim 1.

As per claim 23, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about a portion of predetermined size of the total disk storage space includes restricting the reserved portion of predetermined size of the total disk storage space from being included in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraph [0015]).

As per claim 25, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Talluri teaches about monitoring at least one of the grid computers for activity indicating that a total of disk storage space on the at least one grid computer has been increased, wherein monitoring includes determining that a total disk storage space on the at least one grid computer has been increased when the agent application (i.e. the storage policy) detects the addition of a

disk drive (i.e. additional data storage resource) to the at least one grid computer (this feature is inherently taught by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider) (e.g. see paragraph [0016]).

As per claims 10 and 18, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches about providing a safe area on disk storage space of the virtual storage drive, the safe area being kept free of data (i.e. keeping 15% of the PC's disk space "free") (e.g. see paragraphs [0030]-[0031]). Although Ebstyne does not specify what the "free" disk space mean, i.e. not storing data at all; or reserving for local use, one ordinary skill in the art would believe that "free" disk space means the disk space that is "empty" of any data, as admitted by the Applicant in the response filed on 10/04/2007 (see page 13 of 17, 2nd paragraph).

As per claim 11, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the method additionally including loading the agent application (i.e. the client tier) on each of the at least two grid computers (i.e. in each PC) for managing the portion of the unused portion of the total disk storage space on the grid computer made available to the virtual storage drive (e.g. see paragraphs [0047]).

As per claim 20, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the step of

reserving a portion of the total disk storage space includes restricting the reserved portion from inclusion in the single virtual storage presented (i.e. 15% of the disk space is reserved from inclusion in the single virtual storage) (e.g. see paragraph [0031]).

As per claim 22, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches that the step of presenting includes presenting the single combined virtual storage drive to a user of the at least one grid computer (e.g. see paragraph [0058]).

7. Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Ebata et al. (USPN: 2004/0044698) hereinafter, Ebata.

As per claim 8, the combination of Ebstyne and Talluri teaches the claimed invention as described above. Talluri also discloses about reserving the predetermined minimum amount of disk storage space is set by the local user (i.e. the service provider) using an agent application (i.e. the policy) on the at least one grid computer; and receiving on one of the at least one grid computers, from a local user of the one grid computer (i.e. the service provider), designation of a predetermined minimum amount of disk storage space on the disk drive of the one grid computer to be reserved from inclusion in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraphs [0015]-[0016]). Talluri further teaches about monitoring the one grid computer for activity indicating that

the predetermined minimum amount of reserved disk storage space of the total disk storage space on the one grid computer has not been maintained (the Talluri reference clearly discloses in paragraph [0016] about seamlessly segmenting available data storage capacity on other servers and using a percentage of it for storing data from a particular server, when the data stored on the particular server is approaching the maximum available capacity and the particular server cannot be taken down. In other words, the available data storage capacity is constantly monitored (even after the portion of the storage capacity is assigned from other server(s)) on the particular server to avoid running out of storage capacity on the particular server. Therefore, the claimed "monitoring" step has to be performed by the particular server for detecting that the additional storage space has been assigned/allocated so the "running out of storage capacity flag/situation" in the particular server is removed at least for a while until the newly assigned/allocated storage space fills up). However, both Ebstyne and Talluri failed to specifically teach the further limitation of allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space.

Ebata, on the other hand, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum

amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the step taught by Ebata in the method taught by the combination of Ebstyne and Talluri. In doing so, (i) a steady imbalance of the free disk spaces among the network storages is prevented so that clients can always use the system and even if client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

As per claim 17, see arguments with respect to the rejection of claim 8. Claim 17 is also rejected based on the same rationale as the rejection of claim 8.

8. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Wells et al. (USPN: 5,416,782) hereinafter, Wells.

As per claim 10, the combination of Ebstyne and Talluri teaches the claimed invention as described above and furthermore, Ebstyne teaches the claimed limitation as described above. Although Applicant admitted in the last response (as described above), just for sake of argument, if one ordinary skill in the art would not interpret/believe that "free" disk space means the disk space that is "empty" of any data, then Examiner would like to introduce the Wells prior art. Wells teaches about keeping a portion of the memory space free of data to allow the cleanup operation (e.g. see Col.

5, lines 1-6). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the step taught by Wells in the method taught by the combination of Ebstyne and Talluri. In doing so, data can be temporarily stored at this safe area when (i) data needs to be transferred within the memory space; and (ii) the cleanup operation is required to run.

As per claim 18, see arguments with respect to the rejection of claim 10. Claim 18 is also rejected based on the same rationale as the rejection of claim 10.

9. Claims 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Watkins et al. (USPN: 2002/0015336) hereinafter, Watkins.

As per claim 12, the combination of Ebstyne and Talluri teaches the claimed invention as described above, but does not teach the step of backing up data by copying data from the reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was

made to implement the teachings of Watkins in the method taught by the combination of Ebstyne and Talluri so in the event of failure of any one of the data storage devices, data can be recovered from the second data storage areas of the other data storage devices.

As per claim 19, see arguments with respect to the rejection of claim 12. Claim 19 is also rejected based on the same rationale as the rejection of claim 12.

10. Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talluri, further in view of Ebata.

As per claim 8, Talluri teaches the claimed invention as described above. Talluri also discloses about reserving the predetermined minimum amount of disk storage space is set by the local user (i.e. the service provider) using an agent application (i.e. the policy) on the at least one grid computer; and receiving on one of the at least one grid computers, from a local user of the one grid computer (i.e. the service provider), designation of a predetermined minimum amount of disk storage space on the disk drive of the one grid computer to be reserved from inclusion in the single combined virtual storage drive (i.e. certain percentage of unused storage capacity is dedicated solely for the local use on the node and not made available to share with other resources/nodes) (e.g. see paragraphs [0015]-[0016]). Talluri further teaches about monitoring the one grid computer for activity indicating that the predetermined minimum amount of reserved disk storage space of the total disk storage space on the one grid computer has not been maintained (the Talluri reference clearly discloses in paragraph

[0016] about seamlessly segmenting available data storage capacity on other servers and using a percentage of it for storing data from a particular server, when the data stored on the particular server is approaching the maximum available capacity and the particular server cannot be taken down. In other words, the available data storage capacity is constantly monitored (even after the portion of the storage capacity is assigned from other server(s)) on the particular server to avoid running out of storage capacity on the particular server. Therefore, the claimed "monitoring" step has to be performed by the particular server for detecting that the additional storage space has been assigned/allocated so the "running out of storage capacity flag/situation" in the particular server is removed at least for a while until the newly assigned/allocated storage space fills up).

However, Talluri failed to specifically teach the further limitation of allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space. Ebata, on the other hand, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current

invention was made to implement the step taught by Ebata in the method taught by Talluri. In doing so, (i) a steady imbalance of the free disk spaces among the network storages is prevented so that clients can always use the system and even if client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

As per claim 17, see arguments with respect to the rejection of claim 8. Claim 17 is also rejected based on the same rationale as the rejection of claim 8.

11. Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable Talluri in view of Wells.

As per claim 10, Talluri teaches the claimed invention as described above, but failed to teach about keeping a portion of the memory space free of data to allow the cleanup operation. Wells, however, teaches about keeping a portion of the memory space free of data to allow the cleanup operation (e.g. see Col. 5, lines 1-6). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the step taught by Wells in the method taught by Talluri. In doing so, data can be temporarily stored at this safe area when (i) data needs to be transferred within the memory space; and (ii) the cleanup operation is required to run.

As per claim 18, see arguments with respect to the rejection of claim 10. Claim 18 is also rejected based on the same rationale as the rejection of claim 10.

12. Claims 12 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Talluri in view of Watkins.

As per claim 12, Talluri teaches the claimed invention as described above, but does not teach the step of backing up data by copying data from the reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Watkins in the method taught by Talluri so in the event of failure of any one of the data storage devices, data can be recovered from the second data storage areas of the other data storage devices.

As per claim 19, see arguments with respect to the rejection of claim 12. Claim 19 is also rejected based on the same rationale as the rejection of claim 12.

13. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ebstyne in view of Talluri, further in view of Ebata and Watkins.

As per claim 21, Ebstyne teaches a method of creating a virtual disk storage (i.e. the aggregated contiguous virtual data storage space) construct using disk storage consolidated from at least two grid computers (i.e. from PC hard drives from distributed network system) of a computing grid utilizing a connecting network (i.e. via network as shown in Fig. 1), comprising:

- loading an agent application (i.e. a part of the client tier in all enterprise personal computers) onto at least one grid computer of the at least two grid computers (in all enterprise personal computers) (see paragraph [0077]);
- locating, by the agent application (i.e. a part of the client tier; see paragraph [0079]), an unused portion of disk storage space on a disk drive of the at least one grid computer (i.e. unused/additional hard drive space from the PCs on the distributed network system) connected by the connecting network of the computing grid; and presenting, as a single combined virtual storage drive on at least one computer (i.e. for any PC connected on the enterprise network), a portion of the unused portion (i.e. the unused/additional hard drive space from the PCs on the distributed network system) of the disk storage space from the disk drive of the at least one grid computer (i.e. the aggregated contiguous virtual data storage space made of plurality of PC hard drives on network) (e.g. see paragraphs [0025]-[0026] and [0030]-[0031] and Fig. 1);

- receiving, by the agent application on the at least one grid computer, from a local user of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local use by the local user (Ebstyne discloses, in paragraph [0077], "[T]he client tier 46 serves several functions, such as *reserving a configurable portion of available storage space* and reacting dynamically to the changing local environment.", i.e. the admin/user can configure/designate the portion of available space to be reserved);
- allocating a portion of the total disk storage space on the at least one grid computer (i.e. the unused/additional hard drive space from the PCs on the distributed network system) to be made available as part of the virtual storage drive (i.e. the aggregated contiguous virtual data storage space) (e.g. see paragraphs [0025]-[0026]);
- reserving a portion of predetermined size of the total disk storage space (i.e. 15% of the PD's disk space) on the at least one grid computer (i.e. PCs on the network) (e.g. see paragraph [0031]);
- determining, by the agent application, the total disk storage space on the at least one grid computer and allocating by the agent application the total disk storage space (i.e. more than 1.5 petabytes) on the at least one grid computer between a portion made available for use as part of the virtual storage drive (i.e. about 330 terabytes of additional/unused space) and leaving a portion of the total disk space as free (i.e. 15% of the disk space)

(e.g. see paragraph [0031]); wherein the portion available for use as part of the virtual storage space is of a fixed size (i.e. 85% of the disk space) and the free portion is of a fixed size (i.e. 15% of the disk space) (e.g. see paragraph [0031]);

- maintaining a table of grid computers contributing storage space to the virtual storage drive and corresponding amounts of storage space made available by each contributing grid computers (e.g. see paragraph [0067]);
- allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]); and
- providing a safe area on disk storage space of the virtual storage drive, the safe area being kept free of data (i.e. keeping 15% of the PC's disk space "free") (e.g. see paragraphs [0030]-[0031]). Although Ebstyne does not specify what the "free" disk space mean, i.e. not storing data at all; or reserving for local use, one ordinary skill in the art would believe that "free" disk space means the disk space that is "empty" of any data, as admitted by

the Applicant in the response filed on 10/04/2007 (see page 13 of 17, 2nd paragraph).

However, Ebstyne does not disclose about monitoring at least one of the grid computers for activity indicating that additional disk storage space has been *added* to the at least one grid computer. Talluri, on the other hand, teaches the claimed monitoring step by disclosing about using the portion/percentage of the available/unused data storage capacity from the other servers/nodes temporarily, until additional data storage resources on this particular server is installed/added by the service provider (e.g. see paragraph [0016]). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Talluri in the method taught by Ebstyne so whenever a new storage disk is added to a node, it can be detected and the portion of the unused space of the new storage disk can be added to the aggregated contiguous virtual data storage space for use by other nodes. Therefore, the new storage disk space can be used efficiently.

Ebstyne also failed to specifically disclose that (i) the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers; and (ii) the free portion is reserved for local use on the grid computers. Talluri, however, discloses about reserving a portion of predetermined size of the total disk storage space (i.e. certain percentage of unused storage capacity on a node is dedicated solely to that particular node) on the at least one grid computer (i.e. nodes),

the reserved portion of the disk drives being reserved for local use on the respective grid computer of the at least two grid computers (e.g. see paragraph [0015]).

Talluri also teaches about allocating disk storage space on the at least one grid computer after detecting activity indicating that additional storage space has been added to the at least one grid computer (i.e. once the additional data storage resources on a particular server, which uses a portion of the storage resource of the other server/node, is installed/added, the said portion of the storage resource of the other server/node is released for use by other needed servers/nodes. The said use of the additional data storage resources is considered as *allocated* for use by local node/server either in full or partially) (e.g. see paragraph [0016]).

Both Ebstyne and Talluri failed to specifically teach the further limitations of (i) monitoring the one grid computer for activity indicating that the predetermined minimum amount of reserved disk storage space of the total disk storage space on the one grid computer has not been maintained; and (ii) allocating disk storage space on the one grid computer for use by local applications after detecting activity indicating that the minimum amount of reserved disk storage space has not been maintained to restore at least the predetermined minimum amount of reserved disk storage space. Ebata, however, teaches a method for moving files between storages across the network to rebalance the free disk space across the network. Ebata further teaches the step of monitoring at least one of the grid computers (i.e. at least one of the storage across the network) for activity indicating that a predetermined minimum amount (i.e. the threshold value) of free disk storage space of the total disk storage space on the grid computer

has not been maintained (i.e. there is imbalance in available and minimum free disk space), wherein the predetermined minimum amount of free disk storage space is set using an agent application (i.e. an instruction from an administrator) on the at least one grid computer (i.e. the threshold value is set in the configuration information module (i.e. 180 in Fig. 1) of at least one grid computer (i.e. 8 in Fig. 1) (e.g. see paragraph [0045]); and (ii) allocating disk storage space on the at least one grid computer for use by local applications after detecting activity indicating that the minimum amount of free disk storage space has not been maintained to restore at least the minimum amount of free disk storage space (e.g. see the abstract). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the steps taught by Ebata in the method taught by the combination of Ebstyne and Talluri. In doing so, (i) a steady imbalance of the free disk spaces among the network storages is prevented so that clients can always use the system and even if client writes large files and a maximum quantity of data can be written to disks managed by the virtualized network storage system; and (ii) during file migration between network storages, access requests from clients are not stopped while a file is being moved between network storages (e.g. see paragraphs [0015]-[0016]).

None of Ebstyne, Talluri and Ebata teaches the step of backing up data by copying data from a reserved portion of the disk storage space to the virtual storage drive. Watkins, however, discloses a step of copying data from a reserved portion (i.e. the second data storage areas, 509-511 in Fig. 5) of the disk storage space (i.e. 200-202 in Fig. 2) of at least one of the grid computers (i.e. 100-102 in Fig. 1) to an available

portion of at least two other grid computers of the computing grid that have been made available to the virtual storage drive (i.e. the first data storage areas, 203-205 in Figs. 2 and 5) to thereby backup the copied data from the reserved portion of the at least one grid computer (e.g. see the abstract and Figs. 1-2 and 5). Accordingly, it would have been obvious to one ordinary skilled in the art at the time of the current invention was made to implement the teachings of Watkins in the method taught by the combination of Ebstyne, Talluri and Ebata so in the event of failure of any one of the data storage devices, data can be recovered from the second data storage areas of the other data storage devices.

Remarks

14. As to the remark, Applicant asserted that the previously cited art does not teach of suggest the receiving, by the agent application on the at least one grid computer, from a local user of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local use by the local user.

Examiner respectfully traverses Applicant's remark for the following reasons:

Talluri does teach about receiving, by the agent application (i.e. storage policy) on the at least one grid computer (i.e. one of the nodes), from a local user (i.e. admin/user) of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local

use by the local user (i.e. minimum amount/percentage of unused storage space/capacity to be maintained/reserved on SG or at least one node is inherently defined/designed/set by the user in the storage policy. In other words, the admin/user of the storage system has to initially set the minimum amount/percentage described above in the storage policy).

Ebstyne also discloses about receiving, by the agent application (i.e. the client tier) on the at least one grid computer, from a local user of the at least one grid computer, designation of a minimum amount of disk storage space to be reserved on the disk drive of the at least one grid computer for local use by the local user (Ebstyne discloses, in paragraph [0077], "[T]he client tier 46 serves several functions, such as *reserving a configurable portion of available storage space* and reacting dynamically to the changing local environment.", i.e. the admin/user can configure/designate the portion of available space to be reserved).

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HETUL PATEL whose telephone number is (571)272-4184. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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